

WHAT IS CLAIMED IS:

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1. An uplink transmitting device in a mobile communication system,
comprising:

an encoder for receiving an information bit stream and for generating an
information symbol, a first parity symbol, and a second parity symbols by encoding the
information bit stream;

an interleaver for interleaving the encoded symbols by a predetermined
interleaving rule;

a radio frame segmenter for receiving symbols from the interleaver and
outputting the received symbols in at least one radio frame, each of the at least one radio
frame having the same size;

a demultiplexer for demultiplexing each of the at least one radio frame received
from the radio frame segmenter into three streams, one of information symbols, one of
first parity symbols, and one of second parity symbols; and

a rate matcher for bypassing the information symbols and for puncturing parts of
the first and second parity symbols according to a given rate matching rule.

2. The transmitting device of claim 1, wherein the size of the at least one
radio frame is 10ms.

3. The transmitting device of claim 1, wherein the information bit stream is
transmitted at a predetermined transmission time interval (TTI), said TTI being one of
10, 20, 40, and 80ms.

4. The transmitting device of claim 1, wherein the interleaving rule is a bit
reverse column transposition method.

5. The transmitting device of claim 1, wherein the symbols in each radio frame are repeated according to a pattern.

6. The transmitting device of claim 1, wherein several of the at least one radio frame generated from the radio frame segmenter have a different initial symbol.

7. The transmitting device of claim 6, wherein a plurality of the at least one radio frame have initial symbols determined by TTI.

8. The transmitting device of claim 5, wherein the demultiplexer demultiplexes each of the symbols in the at least one radio frame into information symbols, first parity symbols, and second parity symbols according to a switching rule determined by the TTI and the repetition pattern of each of the radio frames.

9. The transmitting device of claim 8, further comprising:
a memory for storing initial symbols of a plurality of at least one radio frame;
and
a controller for controlling the demultiplexer according to the repetition pattern and the stored initial symbols of the at least one radio frame.

10. The transmitting device of claim 9, further comprising:
a multiplexer for multiplexing the outputs of the rate matcher according to the controller controlling the demultiplexer.

11. The transmitting device of claim 1, wherein the interleaver inserts filler bits between the symbols in order to equalize the size of radio frames.

12. The transmitting device of claim 1, wherein the rate matcher comprises:
 a first component rate matcher for rate-matching the information symbols;
 a second component rate matcher for rate-matching the first parity symbols; and
 a third component rate matcher for rate-matching the second parity symbols.

5 13. A transmitting device in a mobile communication system, comprising:
 an encoder for receiving an information bit stream transmitted at a
 predetermined transmission time interval (TTI) and for generating an information
 symbol and at least one parity symbol corresponding to the information symbol by
 encoding each of the received information bit, the number of the at least one parity
 symbol corresponding to each information symbol being dependent on a coding rate of
 said encoder;

10 an interleaver for receiving the information symbols and the parity symbols from
 the encoder, for interleaving the information symbols and the parity symbols, and for
 outputting interleaved symbols;

15 a radio frame segmenter for receiving the interleaved symbols from the
 interleaver, for dividing the received symbols into at least one radio frame, and for
 outputting the at least one radio frame, each of the at least one radio frame having a
 predetermined time frame;

20 a rate matcher for rate matching received symbols and for outputting rate
 matched symbols, said rate matcher having an information symbol component for rate
 matching information symbols and at least one parity symbol component for rate
 matching parity symbols, the number of parity symbol components being equal to the
 number of the parity symbols corresponding to each information symbol; and

25 a demultiplexer for receiving the at least one radio frame and for demultiplexing
 the symbols in each of the at least one radio frame by switching each of the symbols in
 the radio frames to a corresponding component in the rate matcher;

wherein the demultiplexer switches in accordance with a symbol repetition

pattern assigned to each of the radio frames.

14. The transmitter device of claim 13, wherein the symbol repetition pattern is determined by the TTI.

15. The transmitter device of claim 14, wherein the symbol repetition pattern is further determined by the coding rate.

16. The transmitter device of claim 14, wherein the symbol repetition pattern is further determined by the total number of filler bits used by the radio frame segmenter.

17. The transmitter device of claim 13, further comprising:
a multiplexer for multiplexing the rate matched symbols by synchronizing the multiplexing with the demultiplexer by switching to the corresponding component in the rate matcher.

18. The transmitter device of claim 17, further comprising:
a controller for controlling the switching of the demultiplexer and the multiplexer based on the TTI and the length of each of the at least one radio frame.

19. The transmitter device of claim 18, wherein the controller controls the switching based on the total number of filler bits used by the radio frame segmenter.

20. The transmitter device of claim 13, wherein the predetermined time frame of each of the at least one radio frame is 10ms.

21. The transmitter device of claim 13, wherein the TTI is one of 10, 20, 40

and 80 ms.

22. The transmitter device of claim 13, wherein the coding rate is $1/3$.

23. The transmitter device of claim 13, wherein the interleaver inserts filler bits between the interleaved symbols.

24. The transmitter device of claim 13, wherein the radio segmenter inserts filler bits into the at least one radio frame.

25. The transmitter device of claim 18, further comprising a memory for storing the symbol repetition pattern including an initial symbol of each of the at least one radio frame.

26. The transmitter device of claim 13, wherein the encoder is a turbo encoder.

27. A method of transmitting in a mobile communication system, the method comprising the steps of:

receiving an information bit stream transmitted at a predetermined transmission time interval (TTI);

generating an information symbol and at least one parity symbol corresponding to the information symbol by encoding each of the received information bit, the number of the parity symbols corresponding to each information symbol being dependent on a coding rate of said encoder;

interleaving the information symbols and the parity symbols and outputting interleaved symbols;

dividing the interleaved symbols into at least one radio frame and outputting the

at least one radio frame, each of the at least one radio frame having a predetermined time frame;

demultiplexing the symbols in each of the at least one radio frame by switching each of the symbols in the at least one radio frame to a corresponding component in a rate matcher, said rate matcher having an information symbol component for rate matching information symbols and at least one parity symbol component for rate matching parity symbols, the number of parity symbol components being equal to the number of the parity symbols corresponding to each information symbol; and

rate matching the demultiplexed symbols;

wherein the information symbols are switched to the information symbol component and the parity symbols are switched to the parity symbol component in accordance with a symbol repetition pattern assigned to each of the at least one radio frame.

28. The method of claim 27, wherein the symbol repetition pattern is determined by the TTI.

29. The method of claim 28, wherein the symbol repetition pattern is further determined by the coding rate.

30. The method of claim 28, wherein the symbol repetition pattern is further determined by a total number of filler bits used by a radio frame segmenter.

31. The method of claim 27, further comprising the step of:
multiplexing the rate matched symbols by synchronizing the multiplexing with the demultiplexing through switching to the corresponding component in the rate matcher.

32. The method of claim 27, wherein the predetermined time frame of each of at least one radio frame is 10ms.

33. The method of claim 27, wherein the TTI is one of 10, 20, 40 and 80 ms.

34. The method of claim 27, wherein the coding rate is $1/3$.

35. The method of claim 27, further comprising the step of: inserting filler bits into the interleaved symbols.

36. The method of claim 27, further comprising the step of: inserting filler bits into the radio frames.

37. A transmitting device in a mobile communication system, comprising:
an encoder for receiving an information bit stream transmitted at a predetermined transmission time interval (TTI) and for generating an information symbol and at least one kind of parity symbol corresponding to the information symbol by encoding each of the received information bits, the number of the parity symbols corresponding to each information symbol being dependent on a coding rate of said encoder;

an interleaver for receiving the information symbols and the parity symbols from the encoder, for interleaving the information symbols and the parity symbols, and for outputting interleaved symbols in a plurality of radio frames, each of the radio frames having a predetermined number of symbols;

a rate matcher for rate matching received symbols, said rate matcher having an information symbol component for rate matching information symbols and at least one parity symbol component for rate matching parity symbols; and

a demultiplexer for receiving the radio frames and for demultiplexing the symbols in each of the radio frames by switching each of the symbols to a corresponding component in the rate matcher.

5 38. The transmitter device of claim 37, wherein the demultiplexer switches in order to separate the information symbols and the parity symbols.

39. The transmitter device of claim 37, wherein the information symbol component operates to repeat a part of the information symbols.

10 40. The transmitter device of claim 37, wherein the radio frames have symbol repetition patterns.

15 41. The transmitter device of claim 40, wherein the symbol repetition patterns are determined by the total number of filler bits.

20 42. The transmitter device of claim 37, further comprising:
a multiplexer for synchronously multiplexing the output symbols of the rate matchers by synchronizing with the demultiplexer.

25 43. The transmitter device of claim 42, further comprising:
a controller for controlling the switching of the demultiplexer and the
30 multiplexer based on an initial symbol and repetition pattern.

44. The transmitter device of claim 43, wherein the controller controls the switchings based on the total number of filler bits.

45. The transmitter device of claim 37, wherein a predetermined time frame of each of the radio frames is 10ms.

46. The transmitter device of claim 37, wherein the TTI is one of 10, 20, 40 and 80 ms.

47. The transmitter device of claim 37, wherein the coding rate is 1/3.

48. The transmitter device of claim 37, wherein the interleaver inserts filler bits in order to equalize the size of radio frames.

49. The transmitter device of claim 41, further comprising:
a memory for storing the symbol repetition pattern including an initial symbol of each of the radio frames.

50. The transmitter device of claim 37, wherein the encoder is a turbo encoder.

51. A method of transmitting in a mobile communication system, the method comprising the steps of:

receiving an information bit stream at a predetermined transmission time interval (TTI);

generating information symbols and at least one kind of parity symbols corresponding to the information symbol by encoding each of the received information bits;

interleaving the information symbols and the parity symbols and outputting interleaved symbols in a plurality of radio frames;

demultiplexing the symbols in each of the radio frames by switching each of the symbols in the radio frames to a corresponding component in a rate matcher, said rate
5 matcher having an information symbol component for rate matching information symbols and at least one parity symbol component for rate matching parity symbols; and rate matching the demultiplexed symbols;

wherein the information symbols are switched to the information symbol component and the parity symbols are switched to the parity symbol component in accordance with a symbol repetition pattern assigned to each of the radio frames.

52. The method of claim 51, wherein the symbol repetition pattern is determined by the TTI.

53. The method of claim 52, wherein the symbol repetition pattern is further determined by an index of each of the radio frames.

54. The method of claim 52, wherein the symbol repetition pattern is further determined by a total number of filler bits.

55. The method of claim 51, further comprising the step of:
multiplexing the output symbols of the rate matching step by synchronizing the multiplexing with the demultiplexing by switching to the corresponding component in the rate matcher.

56. The method of claim 51, wherein a predetermined time frame of each of the radio frames is 10ms.

57. The method of claim 51, wherein the TTI is one of 10, 20, 40 and 80
ms.

58. The method of claim 51, wherein the coding rate is $1/3$.

59. The method of claim 51, further comprising the step of:
inserting filler bits in order to make the radio frames equal in size.

60. The method of claim 51, further comprising the step of:
inserting filler bits before outputting the interleaved symbols.

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